4. Proposed Solutions

Based on the findings from the analysis of traffic volumes, accidents, and geometric deficiencies, as well as existing and future year traffic operations, this I-95 Corridor Study has resulted in a set of Preferred Concepts that could be considered a Master Plan of solutions for the study area. These proposed solutions are comprised of a set of mid-term and long-term capacity improvements that will require more detailed study, local advocacy for funding, and programming into the VDOT Six-Year Improvement Program. Mid-term improvements are defined as those that would be constructed in the next 5 to 10 years. Long-term improvements would be constructed by 2025.

Note that this study reflects a fiscally un-constrained vision and therefore has not been limited by air quality, environmental, or financial planning constraints in developing concept solutions to meet the corridor needs in 2025. The concept plans presented in this section respond to the findings discussed in Section 3.

4.1 TAC Solution Process

As discussed in Section 1 of this report, during this study, Proposed Solutions were developed in close coordination with the TAC members, with the goal of improving mainline and interchange deficiencies and accommodating future year traffic throughout the corridor. Thus, the study team developed a several “Preliminary Concepts” for each interchange. These solutions were reviewed by the TAC, and the number of solutions was pared down to 2 to 3 “Alternative Concepts” per interchange. The study team further analyzed these concepts, and upon subsequent TAC review, a “Preferred Concept” was chosen for each interchange. In addition, the study team also addressed the mainline and developed typical sections to supplement the interchange concepts. These solutions and concepts are described below.

4.2. Preliminary Concepts

The study team developed 17 Preliminary Concepts for the interchanges in the study area, which are listed in **Table 4-1** as options for each interchange, with general descriptions of each option. Concept plans for each of these solutions are included in **Appendix E** of this report.

A full range of options was considered for each interchange, including variations on the cloverleaf design, the addition of flyover ramps, and single point urban interchange (SPUI) designs. It was assumed that all options included the replacement of existing bridges with new structures sized to accommodate projected traffic and meet current standards. All options also included widening the mainline, as well as upgrading the mainline cross-section (adding 12-foot shoulders) to meet current standards. The options also considered upgrades to the existing arterial roadways.

The options that were chosen for further study by the TAC were determined to be more functional, given the projected land use and traffic movements, and practical, given the amount of right-of-way required (currently developed or undeveloped), perceived cost, and

anticipated construction and phasing issues. Other concepts that were considered by the study team prior to developing concept plans for the options listed in **Table 4-1** were several variations of the concepts, as well as more unique designs such as roundabouts, which were determined to be impractical given the traffic volumes and future right-of-way availability.

Table 4-1
Preliminary Concepts

I-95/Route 802 (Lewistown Road) Interchange (Exit 89)	
Option	**Description / Remarks**
1*	▪ 3 loops with no loop in SW quadrant ▪ CD road on northbound I-95 only ▪ Traffic signal at I-95 SB ramp/Route 802 intersection ▪ Allows more developable land in SW quadrant
2*	▪ Full cloverleaf (4 loops) with no traffic signals ▪ CD roads on NB and SB I-95 ▪ Eliminates traffic signals on Route 802 shown in Option 1
3	▪ 3 loops in SE, SW, and NW quadrants ▪ Flyover in lieu of NE loop ▪ Accommodates heavy NB to WB movement and preserves development opportunity in NE quadrant ▪ Difficult to merge flyover with ramp and tie to Lakeridge Parkway intersection
4	▪ Option 3 with mainline shifted east ▪ Provides more room for flyover to touch down on west side and preserves development on west side of I-95 ▪ Requires construction of over one mile of new mainline alignment
5	▪ Split cloverleaf with loops on NE and NW quads and with ramps and traffic signals on Route 802 ▪ Additional interchange to north to accommodate NB to WB movement, with loop in SE quadrant and signal for ramp in NW quadrant ▪ Requires additional right-of-way and new road for access to Lakeridge Parkway, west of Route 802
6	▪ Single point urban interchange ▪ Could include CD roads for both NB and SB I-95 ▪ Requires large, expansive bridge over I-95 ▪ Requires significant storage on the ramps and on Route 802 to accommodate traffic volumes waiting for green phases of signal
I-95/Route 54 (Ashland) Interchange (Exit 92)	
Option	**Description / Remarks**
1	▪ New loop in NW quadrant and CD road on SB I-95 only ▪ Traffic signals on Route 54 intersections with ramps ▪ Accommodates increases in WB to SB volumes ▪ Takes developed land in NW quadrant (in Town of Ashland)
2*	▪ Full cloverleaf (4 loops) with no traffic signals ▪ CD roads on NB and SB I-95 ▪ Eliminates traffic signals on Route 54 ▪ Takes significant amount of developed land (existing restaurants)

Table 4-1 (continued)
Preliminary Concepts

I-95/Route 54 (Ashland) Interchange (Exit 92)	
Option	**Description / Remarks**
3	▪ Full cloverleaf (Option 2) with mainline shifted to east ▪ Allows businesses in developed parcels west of I-95 to remain ▪ Takes developed and developable land east of I-95, but preserves developed land west of I-95 ▪ Requires construction of 1.5 miles of new mainline alignment
4	▪ Single point urban interchange (SPUI) ▪ Requires large, expansive bridge over I-95 ▪ Could include CD roads ▪ Requires significant storage on the ramps and on Route 54 to accommodate traffic volumes waiting for green phases of signal
5*	▪ Flyover for WB to SB movement ▪ Two traffic signals on Route 54, with minimal improvements to existing ramps and no CD roads ▪ Accommodates projected heavy WB to SB movement, but weaves remain on mainline ▪ Preserves developed land west of I-95
6*	▪ New loop in SE quadrant + flyover for WB to SB movement ▪ CD roads on NB and SB I-95 ▪ Accommodates projected traffic and takes weaves off of mainline ▪ Preserves developed land west of I-95
I-95/Route 30 (Kings Dominion) Interchange (Exit 98)	
Option	**Description / Remarks**
1*	▪ New loop in NE quadrant and far NW quadrant ▪ CD road on NB I-95 only ▪ Direct NB ramps into and out of Kings Dominion (KD) ▪ Separates traffic movements to reduce conflicts between Route 30 and KD traffic ▪ Takes portion of developed land in NE quadrant
2*	▪ Route 30 rerouted with new direct access for KD, new bridge for Route 30 ▪ CD roads on SB and NB I-95 ▪ Completely separates Route 30 traffic from KD traffic at interchange ▪ Takes some developed land but provides access to undeveloped parcels
3	▪ Route 30 rerouted with existing direct access for KD reconfigured with SW loop ▪ CD roads on NB and SB I-95 ▪ Eliminates existing Route 30 bridge and ramps ▪ Takes developed land but provides access to undeveloped parcels, with potential to provide KD with additional parking areas
4	▪ New loop in NE quadrant and new loop in SW quadrant connected to KD direct access ramp ▪ CD roads on NB and SB I-95 ▪ Provides direct access into and out of KD, separated from the Route 30 interchange
4A	▪ Option 4 with new access bridge for KD to the south of existing bridge ▪ Provides additional separation between Route 30 and KD interchanges
* Indicates options that were chosen for further study as Alternative Concepts.	

4.3 Alternative Concepts

Through the TAC process, the 17 Preliminary Solutions developed for the interchanges in the study area were pared down to 2 or 3 Alternative Concepts for each of the interchanges. These concepts are listed and described in **Table 4-2**. Concept plans for each of these solutions are included in **Appendix F** of this report.

Each of the Alternative Concepts was analyzed, given the 2025 Projected AADT volumes and peak hour turning movements. Based on the analysis, the study team modified the interchange concepts, including adjusting the sizes and numbers of loops, as well as the length and alignment of ramps and CD roads. These Alternative Concepts were then presented to the TAC for further consideration.

Table 4-2

Alternative Concepts

I-95/Route 802 (Lewistown Road) Interchange (Exit 89)	
Option	**Description / Remarks**
A	▪ Modified Option 1 of the Preliminary Solutions ▪ 3 loops with no loop in SW quadrant ▪ CD roads on both NB and SB I-95 ▪ NE loop extended to account for heavy NB to WB movement ▪ Higher-speed ramps for EB to SB movement, and for WB to NB movement
B	▪ Modified Option 2 of the Preliminary Solutions ▪ Full cloverleaf (4 loops) with no traffic signals ▪ CD roads on NB and SB I-95 ▪ NE loop extended to account for heavy NB to WB movement ▪ Higher-speed ramps for EB to SB movement, and for WB to NB movement ▪ Option A can be an interim phase of Option B
I-95/Route 54 (Ashland) Interchange (Exit 92)	
Option	**Description / Remarks**
A	▪ Modified Option 2 of the Preliminary Solutions ▪ Full cloverleaf (4 loops) CD roads on NB and SB I-95 ▪ Loops and ramps adjusted for volumes and efficient speeds ▪ Still takes significant amount of developed land west of I-95, including existing retail/restaurants
B	▪ Modified Option 6 of the Preliminary Solutions ▪ New loop in SE quadrant and flyover for WB to SB movement ▪ CD roads on NB and SB I-95 ▪ Loops and ramps adjusted for volumes and efficient speeds ▪ Takes additional developable land east of I-95, but preserves developed land west of I-95 ▪ Preserves developed land west of I-95

Table 4-2 (continued)
Alternative Concepts

I-95/Route 54 (Ashland) Interchange (Exit 92)	
Option	**Description / Remarks**
C	▪ Modified Option 5 of the Preliminary Solutions ▪ Flyover for WB to SB movement, located south of the Route 54 bridges ▪ CD roads on NB and SB I-95 ▪ Loops and ramps adjusted for volumes and efficient speeds ▪ Takes additional developable land east and west of I-95, but preserves the developed land west of I-95
I-95/Route 30 (Kings Dominion) Interchange (Exit 98)	
Option	**Description / Remarks**
A	▪ Modified Option 1 of the Preliminary Solutions ▪ New loop in NE quadrant and far NW quadrant ▪ Additional new loop in SE quadrant eliminates traffic signal on Route 30 east of I-95 in Option 1 ▪ CD roads on both NB and SB I-95 ▪ Route 30 widened ▪ Loops and ramps adjusted for volumes and efficient speeds, including larger loops and higher speed ramps ▪ Takes developed land in both SE and NE quadrants
B	▪ Modified Option 2 of the Preliminary Solutions ▪ Route 30 rerouted with new direct access for KD, new bridge for Route 30 ▪ CD roads on SB and NB I-95 ▪ Moves entrance to KD from interchange east to coincide closely with Route 30 entrance/exit ▪ Loops and ramps adjusted for volumes and efficient speeds ▪ Takes developed land and reduces developable land

4.4 Preferred Concepts

Based on the analysis of the Alternative Concepts, and on consensus from the TAC, the study team reduced the alternatives listed above to one Preferred Concept per interchange. The team also developed concepts for typical sections for the I-95 mainline in the study area. It was agreed that these concepts achieved the objectives of this study, which was to develop feasible solutions to address operational and safety concerns, as well as future capacity requirements.

These Preferred Concepts have been developed as ultimate solutions for the 2025 planning horizon. The concepts are shown in **Figures 4-1 through 4-4** and described below. In addition to the capacity improvements for the interchanges and the mainline, the concepts include those improvements that are planned by Hanover County and the Town of Ashland (as discussed in Section 3.7.6).

Upon review of the Preferred Concepts, it is apparent that initial phases of the ultimate solutions are possible. Such interim solutions could be implemented in the near term. Such phasing and implementation is discussed in Section 5 of this report.

4.4.1 I-95 / Route 802 (Lewistown Road) Interchange (Exit 89) – Preferred Concept

As shown in **Figure 4-1**, the Preferred Concept for the I-95/Route 802 interchange is a full cloverleaf design, replacing the existing diamond and including CD roads on both sides of the I-95 mainline. The mainline through the interchange, and north and south of the interchange, is a 10-lane section, with median barrier to separate traffic, given that little right-of-way would be available for a grass median. The existing 2-lane bridge on Route 802 over I-95 would be replaced with a bridge accommodating the wider arterial roadway (4 lanes with 16-ft median) and the loop ramps. Note also that the bridge for Route 657 (Ashcake Road) would also be replaced to accommodate a wider mainline.

In the southbound direction, traffic will exit onto a relatively long CD road, and ramps will merge and diverge along the southbound CD road. Merge and diverge distances and numbers of lanes for the southbound ramps are as follows (note that all distances exclude necessary taper lengths):

- Southbound CD diverge—two-lane diverge from I-95 approximately 2,800 feet long for deceleration and separation from the freeway mainline
- Off-ramp to westbound Lewistown Road—one-lane diverge with a deceleration lane approximately 1,100 feet long
- On-ramp loop from westbound Lewistown Road—one-lane merge with a weave distance of approximately 900 feet on the CD road
- Off-ramp loop to eastbound Lewistown Road—one-lane diverge with a weave distance of approximately 900 feet on the CD road
- On-ramp from eastbound Lewistown Road—one-lane merge with an acceleration lane approximately 1,200 feet long
- Southbound CD merge—one lane merge to I-95 with an approximately 1,600-foot long acceleration lane

In the northbound direction, traffic will exit onto a relatively long CD road, and ramps will merge and diverge along the northbound CD road. Merge and diverge distances and numbers of lanes for the northbound ramps are as follows:

- Northbound CD diverge—two-lane diverge from I-95 approximately 2,800 feet long for deceleration and separation from the freeway mainline
- Off-ramp to eastbound Lewistown Road—one-lane diverge with a deceleration lane approximately 1,400 feet long
- On-ramp loop from eastbound Lewistown Road—two-lane merge with a weave distance of approximately 1,500 feet
- Off-ramp loop to westbound Lewistown Road—two-lane diverge with a weave distance of approximately 1,500 feet
- On-ramp from eastbound Lewistown Road—one-lane merge with an acceleration lane approximately 1,000 feet long
- Northbound CD merge—one lane merge to I-95 with an approximately 1,400-foot long acceleration lane

Note that in **Figure 4-1**, a proposed right-of-way line is shown, indicating the extent of right-of-way preservation needed by VDOT and Hanover County to construct this interchange concept in the future.

4.4.2 I-95 / Route 54 (England Street) Interchange (Exit 92) – Preferred Concept

As shown in **Figure 4-2**, the Preferred Concept for the I-95/Route 54 interchange is a partial cloverleaf design, with a flyover ramp, and CD roads on both sides of the I-95 mainline. The ramp in the NE quadrant remains, while a ramp in the SE quadrant is added. The ramps on the west side of I-95 remain in their current location, thus preserving the developed land (existing retail areas) on the west side of the interchange. The current left turn movement from westbound Route 54 to southbound I-95 (left turn on Route 54) is replaced by the fly-over ramp. This concept meets the needs of future traffic conditions, while also preserving the existing retail areas.

The mainline through the interchange, and north and south of the interchange, is a 10-lane section, with median barrier to separate traffic, given that little right-of-way would be available for a grass median. The existing bridges on Route 54 over I-95 would be replaced with one or two bridges accommodating the wider arterial roadway (6 lanes with median) and the loop ramps to and from the east side of I-95.

Note that to add CD roads and widen the mainline to 10 lanes in this location—and preserve the existing retail developments—the mainline would need to be shifted slightly to the east. In other words, adding CD roads and widening the mainline would need to hold the existing limited access line on the west side of I-95 and work toward the east, taking a portion of land that is developed and available for further development.

Referring to the concept in **Figure 4-2**, in the southbound direction, traffic will exit onto a relatively long CD road, and ramps will merge and diverge along the southbound CD road. Traffic will be able to access Route 54 with a one-lane off-ramp well in advance of Route 54. This direct ramp is intended to serve England Street at the Hill Carter Parkway intersection, precluding the need for traffic turning right at the existing ramp location to weave across Route 54 to make the left into the new Wal-Mart shopping center. (Such a unique ramp configuration will require additional planning and coordination with the Town of Ashland, as well as FHWA, during the implementation process.)

In addition, a second one-lane off-ramp will serve England Street closer to the mainline (at the existing location). A one-lane flyover will serve westbound England Street, and a one-

lane on-ramp will serve eastbound England Street. Ramps will merge and diverge with a southbound CD road. Merge and diverge distances and numbers of lanes for the southbound ramps are as follows:

- Southbound CD diverge—two-lane diverge from I-95 approximately 2,000 feet long for deceleration and separation from the freeway mainline
- Off-ramp to eastbound and westbound England Street at the future Hill Carter Parkway intersection—one-lane diverge that will drop one southbound lane from the CD road resulting in a one-lane CD road south of this ramp
- Off-ramp to eastbound and westbound England Street—one-lane diverge with an deceleration taper from the CD road
- Length of CD road between the above off-ramp and on-ramp from flyover—one lane approximately 500 feet long
- On-ramp from flyover from westbound England Street—one-lane merge with an acceleration lane approximately 800 feet long
- On-ramp from eastbound England Street—one-lane merge with an acceleration lane approximately 2,000 feet long
- Southbound CD merge—one lane merge to I-95 with an approximately 1,600-foot long acceleration lane

Note that the length of CD road between the second southbound off-ramp and the on-ramp from the flyover is not needed for interchange operation. However, the TAC chose to include this road in the concept to allow for emergency vehicle access and diversions off of the mainline during incidents.

In the northbound direction, traffic will exit onto a relatively long CD road, and ramps will merge and diverge along the southbound CD road. A one-lane off-ramp will serve eastbound England Street, and a one-lane loop on-ramp will serve eastbound England Street. A one-lane loop off-ramp will serve westbound England Street, and a one-lane on-ramp will serve westbound England Street. Merge and diverge distances and numbers of lanes for the southbound ramps are as follows:

- Northbound CD diverge—two-lane diverge from I-95 approximately 2,500 feet long for deceleration and separation from the freeway mainline
- Off-ramp to eastbound England Street—one-lane diverge that will drop one northbound lane from the CD road resulting in a one-lane CD road north of this ramp
- On-ramp (loop) (eastbound England Street)—one-lane merge with a weave distance of approximately 1,000 feet
- Off-ramp (loop) (westbound England Street)—one-lane diverge with a weave distance of approximately 1,000 feet
- On-ramp (westbound England Street)—one-lane merge with an acceleration lane approximately 2,000 feet in length
- Northbound CD merge—one lane merge to I-95 with an approximately 1,600-foot long acceleration lane

Note that in **Figure 4-2**, a proposed right-of-way line is shown, indicating the extent of right-of-way preservation needed by VDOT and the Town of Ashland to construct this interchange concept in the future. Existing developed parcels west of the interchange are preserved in this concept. However, developable land is needed east of the interchange to accommodate loop ramps needed to meet the demands of growth in traffic on Route 54 and proceeding to and from I-95.

4.4.3 I-95 / Route 30 (Kings Dominion Boulevard) Interchange – Preferred Concept

As shown in **Figure 4-3**, the Preferred Concept for the I-95/Route 30 interchange modified cloverleaf design that improves on the existing configuration to meet future travel demand. The concept adds CD roads to both sides of the I-95 mainline. The existing loops in the SW and NW quadrants are lengthened, and loops in the SE and NE quadrants are added. The ramps on the west side of I-95 are pushed further to the west, making use of a parcel of land that has limited development potential due to poor access (bordered by the interstate and railroads). Ramps on the east side of I-95 are widened and lengthened. The ramp from I-95 NB separates traffic destined for Kings Dominion (KD) before reaching Route 30. A new on-ramp from KD is added, with a bridge over the off-ramp, allowing traffic from KD to access I-95 without mixing with traffic on Route 30.

The mainline through the interchange, and north and south of the interchange, is widened to a 10-lane section, with median barrier at the interchange, transitioning to/from the existing wider median with grass and trees. The existing bridges on Route 30 over I-95 and over the southbound ramp to KD would be replaced with bridges accommodating the wider arterial roadway (6 lanes with median) and the loop ramps. The existing bridge into KD would be replaced. The mainline bridges over the railroad tracks north of Route 30 would be replaced due to the widening of the mainline and the addition of CD roads.

Referring to the concept in Figure 4-3, in the southbound direction, traffic will exit onto a relatively long CD road, and ramps will merge and diverge along the southbound CD road. A two-lane off-ramp will serve eastbound and westbound Route 30 and the KD flyover. An on-ramp will serve westbound Route 30, an on-ramp will serve the KD flyover, and an on-ramp will serve eastbound Route 30. Merge and diverge distances and numbers of lanes for the southbound ramps are as follows:

- Southbound CD diverge—two-lane diverge from I-95 approximately 2,500 feet long for deceleration and separation from the freeway mainline
- Off-ramp to Route 30 and KD flyover—two-lane diverge, one lane will drop from the CD road south of this ramp, resulting in a single lane CD road
- Length of CD road between the above off-ramp and on-ramp loop from Route 30 — one lane approximately 1,500 feet long
- On-ramp loop from westbound Route 30—one-lane merge with approximately 700 feet of merge distance
- On-ramp loop from KD flyover—one-lane merge with approximately 900 feet of merge distance
- On-ramp from eastbound Route 30—one-lane merge with approximately 2000 feet of merge distance
- Southbound CD merge—one-lane merge to I-95 with an approximately 1,200-foot long acceleration lane

Note that the length of CD road between the southbound off-ramp and the first on-ramp loop from Route 30 is not needed for interchange operation. However, the TAC chose to include this road in the concept to allow for emergency vehicle access and diversions off of the mainline during incidents.

In the northbound direction, traffic will exit onto a relatively long CD road, and ramps will merge and diverge along the southbound CD road, with the exception of an on-ramp from

KD that will directly access I-95. In addition to this new ramp, the concept includes a two-lane off-ramp to serve both KD and eastbound Route 30, an off-ramp to serve westbound Route 30, and an on-ramp to serve westbound Route 30. Merge and diverge distances and number of lanes for the northbound ramps are as follows:

- Northbound CD diverge—two-lane diverge from I-95 approximately 2,500 feet long for deceleration and separation from the freeway mainline
- Off-ramp to KD and eastbound Route 30—two-lane diverge, one lane will drop from the CD north of this ramp resulting in a single lane CD road
- On-ramp directly from KD—one-lane merge with an acceleration lane approximately 1,600 feet long
- On-ramp loop from eastbound Route 30—one-lane merge with a weave distance of approximately 900 feet
- Off-ramp loop to westbound Route 30—one-lane diverge with a weave distance of approximately 900 feet
- On-ramp (westbound Kings Dominion Boulevard)—one-lane merge with approximately 1,300 feet of merge distance
- Northbound C/D merge—one lane merge to I-95 with an approximately 2,000-foot long acceleration lane

Note that in **Figure 4-3**, a proposed right-of-way line is shown, indicating the extent of right-of-way preservation needed by VDOT and Hanover County to construct this interchange concept in the future.

Note also that additional assumptions for lengths of ramps, CD roads, arterial roadways (associated with the interchange improvements), and mainline sections; as well as sizes of bridges and widths of the mainline and roadways, are shown in the quantities column of the Planning Level Cost Estimate included in **Appendix G** and discussed in Section 5 of this report.

4.4.4 I-95 Mainline – Preferred Concept

During the development of interchange concepts, the study team and the TAC also developed concepts for widening the mainline from 6 to 10 lanes to meet future travel demands. It was agreed that an ultimate configuration of 10 lanes would be shown to indicate the needed right-of-way width and provide VDOT, Hanover County, and the Town of Ashland with a tool to assist in preservation of right-of-way.

Typical sections for a 10-lane mainline concept are shown in **Figure 4-4**. The current standard for interstates is shown, including 12-foot lanes, 12-foot inside and outside shoulders, and required clearances to roadside ditches and trees. The current right-of-way available along this corridor within the study area varies in width. In some areas (especially in Ashland and south toward I-295, a narrower 250-foot section with a concrete median barrier would be needed. In areas with a wider right-of-way, widening to 10 lanes could occur to the inside or outside of the current 6-lane section, depending on design and aesthetic considerations.

The widening the mainline to 10 lanes along this 13.5-mile corridor will require the reconstruction of bridges and other structures. In addition to those mentioned above with the interchanges, the following bridges will need to be replaced:

- Jamestown Road overpass
- Hickory Hill Road overpass
- South Anna River mainline bridges
- Old Ridge Road overpass
- Pamunkey River mainline bridges
- North Anna River mainline bridges

4.5 Operational Analysis of Preferred Concepts

The process of developing 17 preliminary concepts and proceeding through an analysis leading to a master plan of conceptual transportation improvements was the result of continuous stakeholder interaction and input, as well as the completion of the analysis of projected traffic conditions in the study area. The Preferred Concepts for the interchanges in the study area, as well as the concepts for widening the I-95 mainline and improving related arterial roadways, were analyzed extensively by the study team, using HCS, CORSIM, and SYNCHRO tools, as well as employing *HCM 2000* and sound transportation planning principles.

For the analysis of the Preferred Concepts, the 2025 projected traffic volumes (as discussed in Section 3 of this report) were applied to the 2025 Master Plan network of the conceptual improvements. This network included the implementation of projects in the Comprehensive Plans of Hanover County and the Town of Ashland, combined with the Preferred Concepts discussed above.

As the 2025 projected traffic volumes were applied and distributed throughout the network, the ramp and CD road lengths and numbers of lanes for each intersection were optimized to achieve acceptable levels of service. For instance, large volumes of traffic required 2-lane exits from the mainline onto CD roads in many cases. The number of weaving movements required weaving areas along CD roads to be lengthened, which elongated the loop ramps.

The geometric improvements of the Preferred Concepts were coded into the CORSIM network (2025 Master Plan), and the CORSIM output provide a means to analyze changes in the operational characteristics. As the geometry was adjusted, these changes were fed back into the network and the 2025 traffic was applied. The result of this analysis is a concept design that is a significant improvement over the “no-build” condition. Computer screen images of these CORSIM networks are included in **Appendix D** of this report.

The study team analyzed traffic operations on the conceptual 10-lane mainline and on the ramps of the Preferred Concepts. **Table 4-3** summarizes the results of the LOS analysis for I-95 mainline segments, and compares the results to the current year analysis and the future year analysis on the no-build network (from Section 3). **Table 4-4** provides a summary of the LOS analysis the interchange ramps of the Preferred Concepts (the current year and future year analysis is not shown since the configuration of these new ramps is significantly different from the existing configuration).

It can be concluded from the results of the analysis shown in **Tables 4-3 and 4-4** that the Preferred Concepts meet the needs of projected travel demand in 2025, providing levels of service at LOS D or better. The Preferred Concepts are a significant improvement over the No-Build conditions discussed in Section 3 of this report.

Table 4-3 — I-95 Mainline Levels of Service
Comparison of
Year 2002 Existing, Year 2025 No-Build, and Year 2025 Master Plan Conditions

	Freeway Segments	Level of Service					
		2002		2025 No-Build		2025 Master Plan	
		AM	PM	AM	PM	AM	PM
I-95 Northbound							
1	South of Route 802	C	C	D	F	B/C	C/D
2	Route 802 to Route 54	C	C	D	F	B/C	C/D
3	Route 54 Route 30	C	C	C/D	F	B	C
4	North of Route 30	B	B	C/D	F	B	C
I-95 Southbound							
1	North of Route 30	C	B	C/D	F	B	C
2	Route 30 to Route 54	C	B	C/D	F	B	C
3	Route 54 to Route 802	C	B/C	D	F	B/C	C/D
4	South of Route 802	C	B	D	F	B/C	C/D

Notes:

1. 2002 Existing volumes (discussed in Section 3.5.1) were applied to the existing 2002 transportation network to result in the levels of service shown.
2. 2025 Projected volumes (discussed in Section 3.5.5) were applied to the 2025 No-Build network to result in the levels of service shown.
3. 2025 Projected volumes were also applied to the 2025 Master Plan network to results in the levels of service shown.

Table 4-4 — Interchange Merge and Diverge Levels of Service
Comparison of
Year 2002 Existing, Year 2025 No-Build, and Year 2025 Master Plan Conditions

Number	Location	Level of Service	
		AM	PM
Southbound – Route 30			
1	SB CD / SB I-95 Diverge	A	A
1a	SB CD to Route 30 Diverge	A	A
2	WB Route 30 / SB CD Merge	A	B
3	KD Blvd Flyover / SB CD Merge	A	B
4	EB Route 30 / SB CD Merge	A	B
5	SB CD / SB I-95 Merge	B	C
Northbound – Route 30			
6	NB CD / NB I-95 Diverge	A	A
8	EB Route 30 / NB CD Diverge	A	A
9	EB/WB Route 30 Weave	A	B
10	WB Route 30 / NB CD Merge	A	B
11	KD Blvd Flyover / NB I-95 Merge	B	B
7	NB CD / NB I-95 Merge	B	C
Southbound – Route 54			
12	Route 54 SB CD I-95 Diverge	C	C
13	Route 54 SB First Ramp Diverge / SB CD	A	A
14	Route 54 SB Second Ramp Diverge / SB CD	A	A
12a	WB Route 54 / SB CD Flyover Merge	A	A
15	EB Route 54 / SB CD Merge	A	A
16	SB CD / SB I-95 Merge	C	B
Northbound – Route 54			
17	Route 54 NB CD I-95 Diverge	A	A
18	EB Route 54 / NB CD Diverge	A	A
19	EB/WB Route 54 Weave	C	D
20	WB Route 54 / NB CD Merge	A	A
21	Route 54 NB CD Merge to I-95	C	B
Southbound – Route 802			
22	SB CD / SB I-95 Diverge	A	B
23	Route 802 WB Ramp Diverge	B	A
24	EB/WB Route 802 Weave	C	B
25	EB Route 802 / SB CD Merge	B	C
26	Route 802 SB CD / I-95 Merge	B	C
Northbound – Route 802			
27	NB CD / I-95 Diverge	A	C
28	EB Route 802 Ramp / NB CD Diverge	B	A
29	EB/WB Route 802 Weave	A	A
30	WB Route 802 Ramp / NB CD Merge	A	B
31	Route 802 NB CD / I-95 Merge	C	C

I-95 CORRIDOR STUDY
HANOVER COUNTY/TOWN OF ASHLAND, VA

LAKERIDGE PARKWAY NORTH
LAKERIDGE PARKWAY SOUTH
802
95
AIR PARK ROAD
ASHCAKE ROAD
LEWISTOWN ROAD
JOHNSON TOWN ROAD
VIRGINIA CRANE DRIVE
HEATHFORD DRIVE
CHERRY WOODS LANE
CHERRY ROAD

LEGEND

- AREA TO BE OBSCURED/DEMOLISHED
- POTENTIAL FOR REDEVELOPMENT
- NEW ROADWAY
- NEW BRIDGE
- CD ROADS
- RAMPS/LOOPS
- I-95 WIDENING
- EXISTING R/W
- PROPOSED R/W
- MEDIAN BARRIER
- RETAINING WALL

Virginia Department of Transportation
Kimley-Horn and Associates, Inc.

I-95/ROUTE 802 INTERCHANGE
(LEWISTOWN ROAD/EXIT 89)

I-95 CORRIDOR STUDY
HANOVER COUNTY/ TOWN OF ASHLAND, VIRGINIA
VDOT TPD 02-02

JUNE 2003

SCALE
0 200 400

FIGURE 4-1
PREFERRED CONCEPT

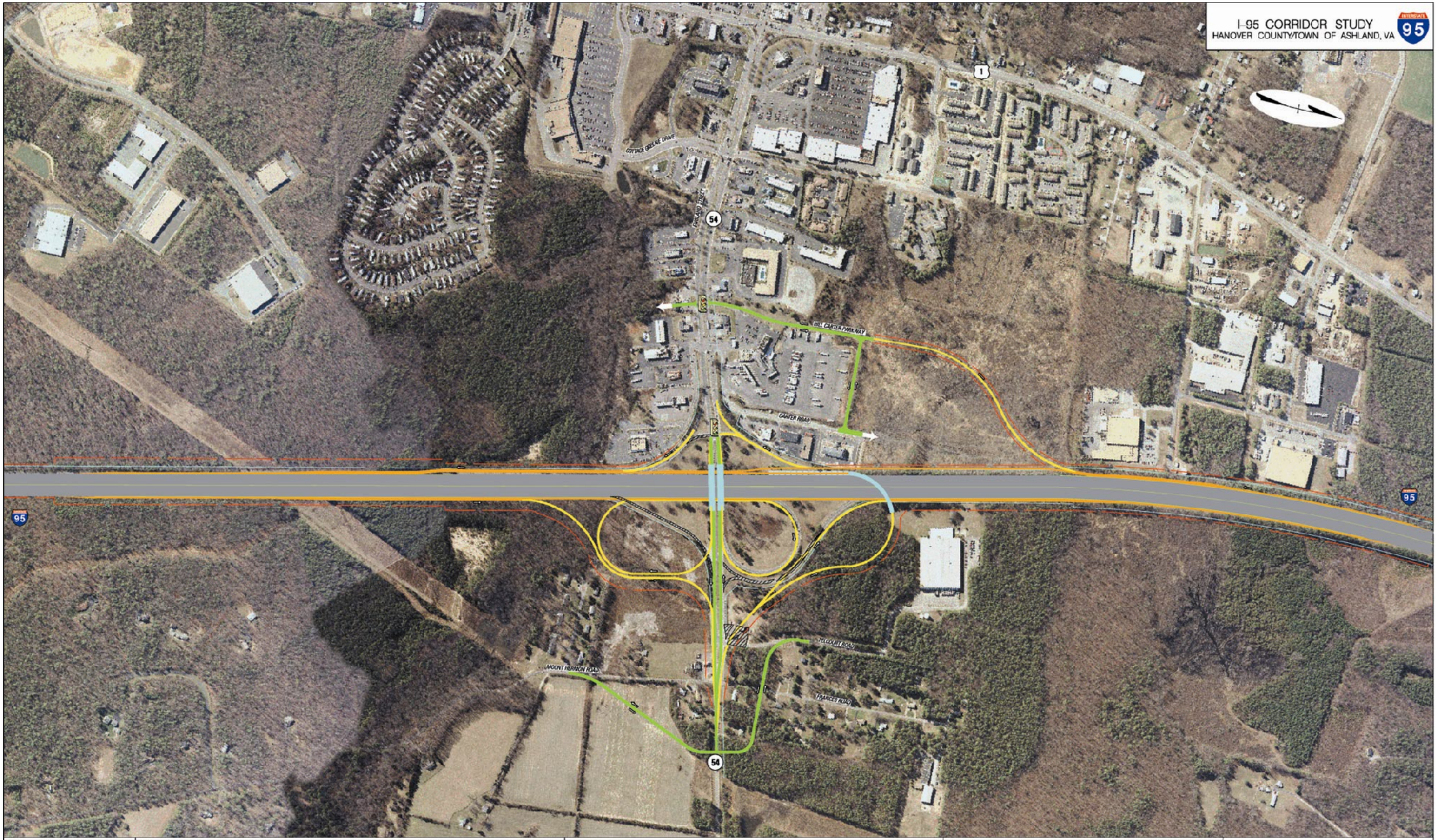
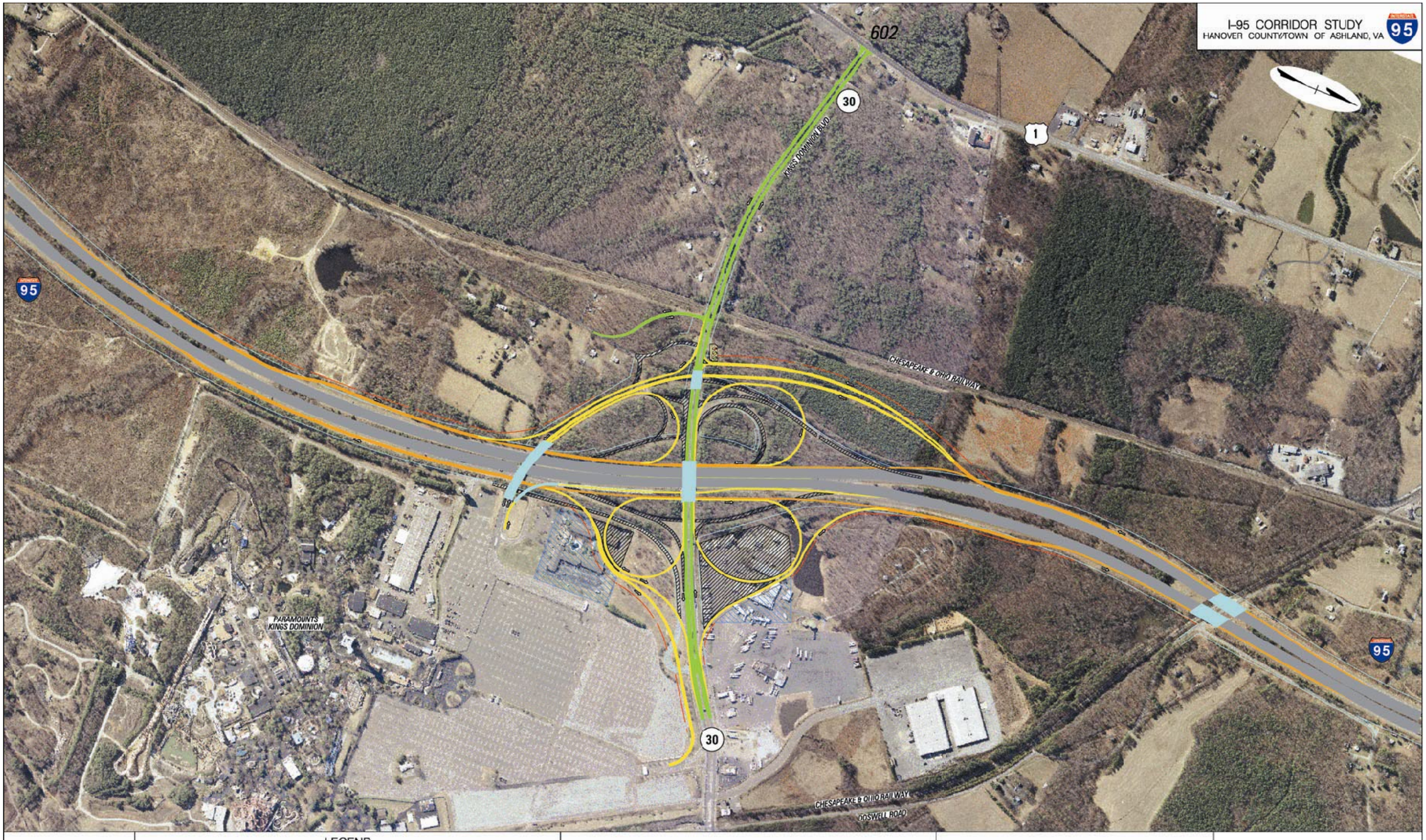


FIGURE 4-2
PREFERRED CONCEPT



Virginia Department of Transportation
VDOT
Kinley-Horn and Associates, Inc.

LEGEND

- AREA TO BE OBSCURED/DEMOLISHED
- POTENTIAL FOR REDEVELOPMENT
- NEW ROADWAY
- NEW BRIDGE
- CD ROADS
- RAMPS/LOOPS
- I-95 WIDENING
- EXISTING R/W
- PROPOSED R/W
- MEDIAN BARRIER
- RETAINING WALL

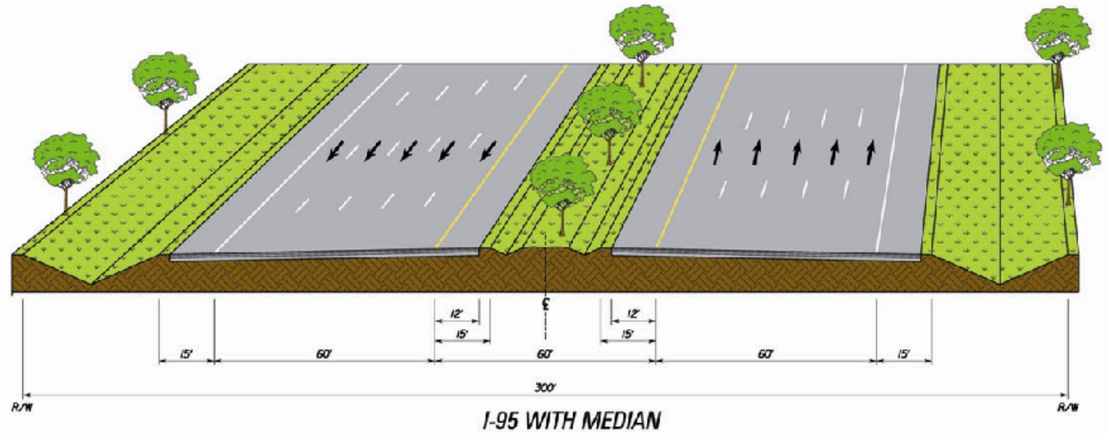
I-95/ROUTE 30 INTERCHANGE
(KINGS DOMINION BOULEVARD/EXIT 98)

I-95 CORRIDOR STUDY
HANOVER COUNTY/ TOWN OF ASHLAND, VIRGINIA
VDOT TPD 02-02

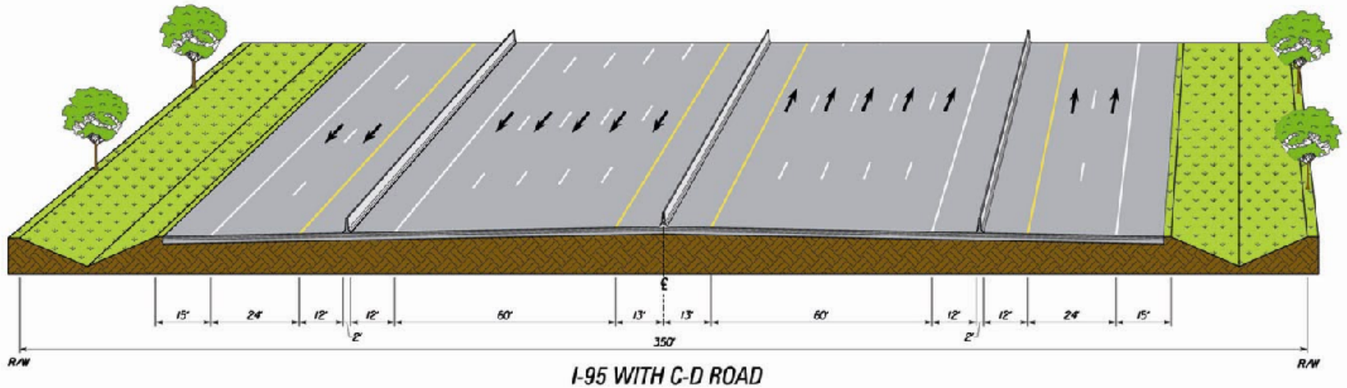
FIGURE 4-3
PREFERRED CONCEPT

JUNE 2003

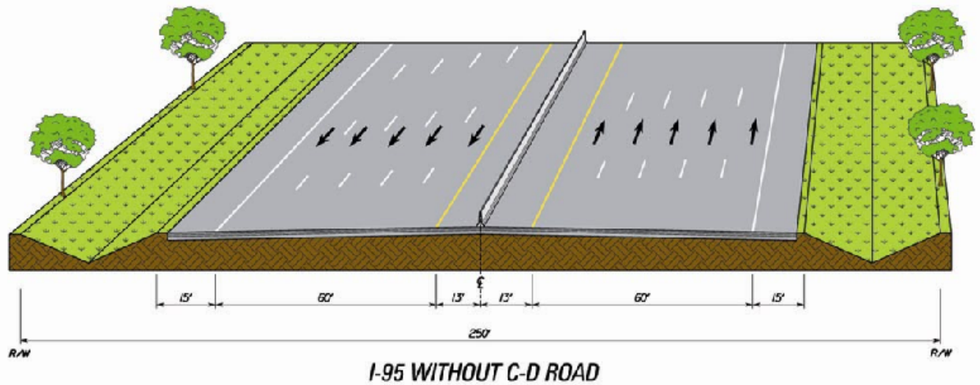
SCALE
0 200 400



I-95 WITH MEDIAN



I-95 WITH C-D ROAD



I-95 WITHOUT C-D ROAD

Virginia Department of Transportation
VDOT
Kimley-Horn and Associates, Inc.

I-95 MAINLINE
RECOMMENDED TYPICAL SECTIONS

I-95 CORRIDOR STUDY
HANOVER COUNTY/ TOWN OF ASHLAND, VIRGINIA
VDOT TPD 02-02

FIGURE 4-4
PREFERRED CONCEPT

JUNE 2003

SCALE
0 200 400